

WHAT IS CLAIMED IS:

1. An electrooptic system array having a plurality of electron lenses, comprising:

at least two electrodes arranged along paths of a plurality of charged-particle beams, each of said at least two electrodes having a plurality of apertures on the paths of the plurality of charged-particle beams; and

a shield electrode which is interposed between said at least two electrodes and has a plurality of shields corresponding to the respective paths of the plurality of charged-particle beams.

2. The array according to claim 1, wherein each shield has an aperture on a path of a corresponding charged-particle beam.

3. The array according to claim 1, wherein said shield electrode is constituted by integrating the plurality of shields.

4. The array according to claim 1, wherein said shield electrode is insulated from said at least two electrodes.

5. The array according to claim 1, wherein said shield electrode is integrated with one of said at least two electrodes.

6. The array according to claim 1, wherein the plurality of shields of said shield electrode receive the same potential.

7. The array according to claim 1, wherein the plurality of shields of said shield electrode receive a potential different from a potential applied to said at least two electrodes.

5 8. The array according to claim 2, wherein the aperture of each shield of said shield electrode is larger in size than the apertures of said at least two electrodes.

9. The array according to claim 1, wherein  
10 said at least two electrodes include first and second electrodes,

each of the first and second electrodes has a plurality of electrode elements with apertures on the paths of the plurality of charged-particle beams,

15 the plurality of electrode elements of the first electrode are grouped in units of rows in a first direction, electrode elements which belong to each group being connected, and

the plurality of electrode elements of the second  
20 electrode are grouped in units of rows in a second direction different from the first direction, electrode elements which belong to each group being connected.

10. The array according to claim 9, wherein the first direction is perpendicular to the second direction.

25 11. An electrooptic system array having a plurality of electron lenses, comprising:

upper, middle, and lower electrodes arranged

along paths of a plurality of charged-particle beams,  
said upper, middle, and lower electrodes having  
pluralities of apertures on the paths of the plurality  
of charged-particle beams;

5           an upper shield electrode which is interposed  
between said upper and middle electrodes and has a  
plurality of shields corresponding to the respective  
paths of the plurality of charged-particle beams; and

          a lower shield electrode which is interposed  
10       between said lower and middle electrodes and has a  
plurality of shields corresponding to the respective  
paths of the plurality of charged-particle beams.

12.    The array according to claim 11, wherein said  
middle electrode includes a plurality of electrode  
15       elements having apertures on the paths of the plurality  
of charged-particle beams.

13.    The array according to claim 12, further  
comprising a middle shield electrode between the  
plurality of electrode elements of said middle  
20       electrode.

14.    The array according to claim 13, wherein the  
plurality of electrode elements of said middle  
electrode are grouped, and electrode elements which  
belong to each group are electrically connected to each  
25       other.

15.    The array according to claim 13, wherein the  
plurality of electrode elements of said middle

electrode are grouped in units of rows, and electrode elements which belong to each group are electrically connected to each other.

16. The array according to claim 11, wherein said  
5 middle electrode has a plurality of electrode units electrically separated in units of rows, and each electrode unit has a plurality of apertures on the paths of corresponding charged-particle beams.

17. The array according to claim 16, wherein each  
10 electrode unit has a rectangular shape.

18. The array according to claim 11, wherein the respective shields of said upper and lower shield electrodes have apertures on the paths of the charged-particle beams.

15 19. The array according to claim 11, wherein  
said upper shield electrode is constituted by integrating the plurality of shields, and  
said lower shield electrode is constituted by integrating the plurality of shields.

20 20. The array according to claim 11, wherein  
said upper shield electrode is insulated from said upper and middle electrodes, and  
said lower shield electrode is insulated from said lower and middle electrodes.

25 21. The array according to claim 11, wherein  
said upper shield electrode is integrated with said upper electrode, and

said lower shield electrode is integrated with  
said lower electrode.

22. The array according to claim 11, wherein the  
plurality of shields of said upper shield electrode and  
5 the plurality of shields of said lower shield electrode  
receive the same potential.

23. The array according to claim 11, wherein the  
plurality of shields of said upper shield electrode and  
the plurality of shields of said lower shield electrode  
10 receive a potential different from a potential applied  
to said upper and lower electrodes.

24. The array according to claim 12, wherein an  
aperture of each shield of said upper shield electrode  
and an aperture of each shield of said lower shield  
15 electrode are larger in size than an aperture of said  
middle electrode.

25. The array according to claim 11, wherein an  
interval between said middle electrode and said upper  
shield electrode and an interval between said middle  
20 electrode and said lower shield electrode are smaller  
than a pitch of a plurality of apertures of said middle  
electrode.

26. A charged-particle beam exposure apparatus  
comprising:

25 a charged-particle beam source for emitting a  
charged-particle beam;

an electrooptic system array which has a

plurality of electron lenses and forms a plurality of intermediate images of said charged-particle beam source by the plurality of electron lenses; and

a projection electrooptic system for projecting  
5 on a substrate the plurality of intermediate images formed by said electrooptic system array,

said electrooptic system array including:

at least two electrodes arranged along paths of a plurality of charged-particle beams, each of said at  
10 least two electrodes having a plurality of apertures on the paths of the plurality of charged-particle beams; and

a shield electrode which is interposed between said at least two electrodes and has a plurality of  
15 shields corresponding to the respective paths of the plurality of charged-particle beams.

27. A charged-particle beam exposure apparatus comprising:

a charged-particle beam source for emitting a  
20 charged-particle beam;

an electrooptic system array which has a plurality of electron lenses and forms a plurality of intermediate images of said charged-particle beam source by the plurality of electron lenses; and

25 a projection electrooptic system for projecting on a substrate the plurality of intermediate images formed by said electrooptic system array,

said electrooptic system array including:

upper, middle, and lower electrodes arranged  
along paths of a plurality of charged-particle beams,  
said upper, middle, and lower electrodes having  
5 pluralities of apertures on the paths of the plurality  
of charged-particle beams;

an upper shield electrode which is interposed  
between said upper and middle electrodes and has a  
plurality of shields corresponding to the respective  
10 paths of the plurality of charged-particle beams; and

a lower shield electrode which is interposed  
between said lower and middle electrodes and has a  
plurality of shields corresponding to the respective  
paths of the plurality of charged-particle beams.

15 28. A device manufacturing method comprising the  
steps of:

installing a plurality of semiconductor  
manufacturing apparatuses including a charged-particle  
beam exposure apparatus in a factory; and

20 manufacturing a semiconductor device by using the  
plurality of semiconductor manufacturing apparatuses,  
the charged-particle beam exposure apparatus  
having:

a charged-particle beam source for emitting a  
25 charged-particle beam;

an electrooptic system array which has a  
plurality of electron lenses and forms a plurality of

intermediate images of the charged-particle beam source  
by the plurality of electron lenses; and

a projection electrooptic system for projecting  
on a substrate the plurality of intermediate images

5 formed by the electrooptic system array,

the electrooptic system array including:

at least two electrodes arranged along paths of a  
plurality of charged-particle beams, each of the at  
least two electrodes having a plurality of apertures on  
10 the paths of the plurality of charged-particle beams;  
and

a shield electrode which is interposed between  
the at least two electrodes and has a plurality of  
shields corresponding to the respective paths of the  
15 plurality of charged-particle beams.

29. The method according to claim 28, further  
comprising the steps of:

connecting the plurality of semiconductor  
manufacturing apparatuses by a local area network;

20 connecting the local area network to an external  
network of the factory;

acquiring information about the charged-particle  
beam exposure apparatus from a database on the external  
network by using the local area network and the  
25 external network; and

controlling the charged-particle beam exposure  
apparatus on the basis of the acquired information.



30. A semiconductor manufacturing factory comprising:  
a plurality of semiconductor manufacturing  
apparatuses including a charged-particle beam exposure  
apparatus;

5 a local area network for connecting said  
plurality of semiconductor manufacturing apparatuses;  
and

a gateway for connecting the local area network  
to an external network of said semiconductor  
10 manufacturing factory,

said charged-particle beam exposure apparatus  
having:

a charged-particle beam source for emitting a  
charged-particle beam;

15 an electrooptic system array which has a  
plurality of electron lenses and forms a plurality of  
intermediate images of said charged-particle beam  
source by the plurality of electron lenses; and

a projection electrooptic system for projecting  
20 on a substrate the plurality of intermediate images  
formed by said electrooptic system array,

said electrooptic system array including:

at least two electrodes arranged along paths of a  
plurality of charged-particle beams, each of said at  
25 least two electrodes having a plurality of apertures on  
the paths of the plurality of charged-particle beams;  
and

a shield electrode which is interposed between said at least two electrodes and has a plurality of shields corresponding to the respective paths of the plurality of charged-particle beams.

- 5 31. A maintenance method for a charged-particle beam exposure apparatus, comprising the steps of:

preparing a database for storing information about maintenance of the charged-particle beam exposure apparatus on an external network of a factory where the  
10 charged-particle beam exposure apparatus is installed;

connecting the charged-particle beam exposure apparatus to a local area network in the factory; and

maintaining the charged-particle beam exposure apparatus on the basis of the information stored in the  
15 database by using the external network and the local area network,

the charged-particle beam exposure apparatus having:

a charged-particle beam source for emitting a  
20 charged-particle beam;

an electrooptic system array which has a plurality of electron lenses and forms a plurality of intermediate images of the charged-particle beam source by the plurality of electron lenses; and

25 a projection electrooptic system for projecting on a substrate the plurality of intermediate images formed by the electrooptic system array,

the electrooptic system array including:

at least two electrodes arranged along paths of a plurality of charged-particle beams, each of the at least two electrodes having a plurality of apertures on  
5 the paths of the plurality of charged-particle beams;  
and

a shield electrode which is interposed between the at least two electrodes and has a plurality of shields corresponding to the respective paths of the  
10 plurality of charged-particle beams.